

Application Number 10/549494
Response to the Office Action dated 2/25/2008

REMARKS

Favorable reconsideration of this application is requested in view of the following remarks.

The information disclosure statement filed on December 2005 has not been acknowledged. Applicants respectfully request the acknowledgment of the information disclosure statement in the next office action.

Claims 1, 3, 8, 27, and 30 have been amended editorially to state clearly that the crystals grow while an alkali metal and/or an alkaline-earth metal and the Group III element are stirred together with nitrogen gas and mixed therewith in the reaction vessel and further supported by the specification at page 2, lines 19-29; claim 12 has been amended editorially; and claim 14 has been amended to refer to claim 12 in addition to editorial revisions.

Claim 28 has been canceled without prejudice.

Claim 43 has been added as supported by Fig. 3 and the specification at page 14, line 21 – page 15, line 2.

Applicants respectfully note that among non-elected claims 37-42, claims 37, 39, and 41 have been withdrawn with traverse in the amendment and response to restriction requirement that was filed on December 4, 2007. Claims 38, 40, and 42 have been canceled without prejudice as the Examiner acknowledged in the Office Action of February 25, 2008.

Claim 14 has been rejected under 35 U.S.C. 112, second paragraph. Claim 14 recites the limitation “the ratio of calcium” and “the ratio of lithium.” There is insufficient antecedent basis for this limitation in claim 14. Applicants respectfully traverse this rejection.

Application Number 10/549494
Response to the Office Action dated 2/25/2008

Claim 14 has been amended to clarify that the ratios for the mixed flux of Na and Ca, or Na and Li apply when Ca or Li is present. Therefore, claim 14 has sufficient antecedent basis. Accordingly, the rejection should be withdrawn.

Claim 28 has been rejected under 35 U.S.C. 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Claim 28 has been canceled, and accordingly, this rejection is moot. Applicants do not concede the correctness of the rejection.

Claims 1, 3-7, 9-12, 17, 18, 20, and 26 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a Large GaN Single Crystal Using the Liquid Phase Epitaxy (LPE) Technique") (Kawamura I) in view of Kojima et al. (Japanese Patent Application Publication No. H1-242483). Applicants respectfully traverse this rejection.

Kawamura I discloses use of Na flux solution system in which GaN crystals are grown (see page L4, the left coln., third paragraph) but fails to disclose that the flux including the alkali metal and/or alkaline-earth metal element and the Group III element are stirred together with nitrogen gas and mixed in a reaction vessel while the crystals are growing as claim 1 requires. Kojima discloses a method to grow crystals by shaking the reaction vessel, which is inclined, until raw materials are melted (see Abstract). Kojima also discloses that the raw materials are prevented from touching the substrate until being melted and then the vessel is moved so that the melted raw materials contact the substrate and crystals grow in that state (Fig 3(b) and (c)). However, Kojima also fails to disclose that the flux including the alkali metal and/or alkaline-earth metal element and the Group III element are stirred together with the nitrogen gas and mixed together in a reaction vessel during the time the crystals are growing. In contrast, claim 1 of the present invention requires that the flux including the alkali metal and/or alkaline-earth metal element and the Group III element are stirred together with nitrogen gas and mixed together in a reaction vessel while the crystals are growing because the stirring and mixing promote dissolution of nitrogen in the mixture, uniform distribution of gallium

Application Number 10/549494
Response to the Office Action dated 2/25/2008

and nitrogen in the flux, and continuous supply of a fresh raw material, which is necessary for the crystals to grow. In addition, those skilled in the art would not be motivated to stir and mix the flux and the Group III element with nitrogen gas during the time the crystals are growing because Kojima grows crystals with the melt being stationary(see *Id.*). Accordingly, claim 1 is distinguished from Kawamura I in view of Kojima, and the rejection of claims 1, 3-7, 9-12, 17, 18, 20, and 26 should be withdrawn.

Claim 8 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a Large GaN Single Crystal Using the Liquid Phase Epitaxy (LPE) Technique") (Kawamura I) in view of Kojima et al. (Japanese Patent Application Publication No. H1-242483) and further in view of D'Evelyn et al. (U.S. Patent No. 6,398,867). Applicants respectfully traverse this rejection.

Claim 8 is distinguished from Kawamura I in view of Kojima for at least the same reasons discussed above for claim 1. D'Evelyn does not disclose or suggest that the flux including the alkali metal and/or alkaline-earth metal element and the Group III element are stirred together with nitrogen gas and mixed in a reaction vessel while crystals are growing. Therefore, D'Evelyn does not remedy the deficiencies of Kawamura I. Accordingly, claim 8 is distinguished from Kawamura I in view of Kojima, further in view of D'Evelyn. Thus, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection.

Claim 14 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a Large GaN Single Crystal Using the Liquid Phase Epitaxy (LPE) Technique") (Kawamura I) in view of Kojima et al. (Japanese Patent Application Publication No. H1-242483), and further in view of Kamura et al. (Synthesis of Bulk GaN Single Crystals Using Na-Ca Flux) (Kawamura II). Applicants respectfully traverse this rejection.

Claim 14 is distinguished from Kawamura I in view of Kojima for at least the same reasons discussed above for claims 1 and 12. Kawamura II does not disclose or suggest that the flux including the metal element and the Group III element are stirred

Application Number 10/549494
Response to the Office Action dated 2/25/2008

together with nitrogen gas and mixed together in a reaction vessel while the crystals are growing as claim 1 requires. Therefore, Kawamura II does not remedy the deficiencies of Kawamura I in view of Kojima. Accordingly, claim 14 is distinguished from Kawamura I in view of Kojima, and further in view of Kawamura II. Thus, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection.

Claims 21 and 24-25 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a Large GaN Single Crystal Using the Liquid Phase Epitaxy (LPE) Technique") (Kawamura I) in view of Kojima et al. (Japanese Patent Application Publication No. H1-242483), and further in view of Shibata et al. (U.S. Patent No. 6,270,569). Applicants respectfully traverse this rejection.

Claims 21, 24, and 25 are distinguished from Kawamura I in view of Kojima for at least the same reasons discussed above for claim 1. Shibata fails to disclose or suggest that the flux including the metal element and the Group III element are stirred together with nitrogen gas and mixed together in a reaction vessel while the crystals are growing as claims 1, 4, 21, 24, and 25 require. Therefore, Shibata does not remedy the deficiencies of Kawamura I in view of Kojima. Thus, claim 1, and accordingly, claims 4, 21, 24, and 25 are distinguished from Kawamura I in view of Kojima, further in view of Shibata. Therefore, the rejection of claims 21, 24, and 25 should be withdrawn. Applicants do not concede the correctness of the rejection.

Claim 27-28 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a Large GaN Single Crystal Using the Liquid Phase Epitaxy (LPE) Technique") (Kawamura I) in view of Kojima et al. (Japanese Patent Application Publication No. H1-242483), and further in view of Hawrylo et al. (U.S. Patent No. 3,811,963). Applicants respectfully traverse this rejection.

Claims 27 and 28 are distinguished from Kawamura I in view of Kojima for at least the same reasons discussed above for claim 1. Hawrylo also fails to disclose or suggest that the flux including the metal element and the Group III element are stirred together with nitrogen gas and mixed together in a reaction vessel while the crystals are

Application Number 10/549494
Response to the Office Action dated 2/25/2008

growing as claims 1, 27, and 28 require, and Hawrylo does not remedy the deficiencies of Kawamura I in view of Kojima. Therefore, claims 1, 27, and 28 are distinguished from Kawamura I in view of Kojima, further in view of Hawrylo. Accordingly, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection.

Claim 30 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Kawamura et al. ("Growth of a Large GaN Single Crystal Using the Liquid Phase Epitaxy (LPE) Technique") (Kawamura I) in view of Kojima et al. (Japanese Patent Application Publication No. H1-242483), and further in view of Inoue et al. (Japanese Patent Examined Patent Application No. S50-11870, i.e., 75-11870). Applicants respectfully traverse this rejection.

Claim 30 is distinguished from Kawamura I in view of Kojima for at least the same reasons discussed above for claim 1. Inoue fails to disclose that the flux including the alkali element and/or alkaline-earth metal element and the Group III element are stirred together with nitrogen gas and mixed together while the crystals are growing as claim 1 requires. Instead, Inoue discloses a carbon body with which the flux including a combination of Ga, GaAs and Si, or Sn, Al, GaAs and Si, etc. is stirred but fails to disclose that the flux includes the alkali metal element and/or the alkaline-earth metal element that is stirred with the Group III element and nitrogen gas and mixed together as claim 1 and accordingly, claims 3 and 30 require. Therefore, Inoue does not remedy the deficiencies of Kawamura I in view of Kojima. Accordingly, claim 30 is distinguished from Kawamura I in view of Kojima, further in view of Inoue. Thus, the rejection should be withdrawn. Applicants do not concede the correctness of the rejection.

Application Number 10/549494
Response to the Office Action dated 2/25/2008

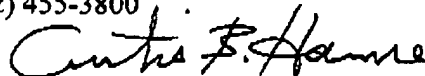
In view of the above, Applicants request reconsideration of the application in the form of a Notice of Allowance.

Respectfully submitted,

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